Amendments to the Claims:

This listing of claims replaces all prior versions and listings of claims in the application:

Listing of Claims:

1. (Previously Presented) A system comprising:

a femtosecond terawatt laser radiation source configured to emit laser radiation through a portion of the atmosphere;

an optical unit configured to receive light backscattered from the portion of the atmosphere; and

a detection and analysis unit coupled to said optical unit for analyzing a spectral signature of the portion of the atmosphere, the detection and analysis unit comprising an infrared spectrometer, a UV/VIS spectrometer, one or more photo-multipliers coupled to an air transient digitizer, and a data acquisition control unit coupled to the spectrometers.

2. (Original) The system of claim 1, further comprising an optical fiber cable coupling said optical unit to said detection and analysis unit.

3. (Canceled).

4. (Original) The system of claim 1, wherein said detection and analysis unit further comprises a real-time computing system for identification and discrimination of at least one of the group comprising: aerosols, airborne bacteria, viruses, toxins, dust particles, pollen, water droplets, gaseous agents, and pollutants.

5. (Original) The system of claim 1, wherein said femtosecond terawatt laser radiation source is amplified by chirped pulse amplification.

6. (Original) The system of claim 1, wherein said femtosecond terawatt laser radiation source is a Ti:Sapphire laser configured to emit energy of approximately 300 mJ per pulse.

7. (Original) The system of claim 6, wherein said femtosecond terawatt laser radiation source has a pulse power of about approximately 3 and 4 TW with a pulse duration approximately of the order of 80 to 100 fs and a repetition rate of approximately 10 Hz.

8. (Previously Presented) The system of claim 1, wherein said femtosecond terawatt laser radiation source emits light within a spectral range approximately centered at 267 nm.

9. (Previously Presented) The system of claim 1, wherein said femtosecond laser radiation source emits laser pulses at a center wavelength of approximately 800 nm to create plasma filaments.

10. (Previously Presented) The system of claim 1, wherein the detection and analysis unit is configured to detect airborne biological, chemical agents and water droplets by at least one technique chosen from the group comprising: differential absorption, Raman LIDAR measurements and Raman, Raleigh and Mie scattering, and by at least one other technique chosen from the group comprising fluorescence, flourescence LIDAR measurements, ground-based LIDAR measurements, and air-based LIDAR measurements.

11. (Original) The system according to claim 1, wherein the detection and analysis unit is configured to provide 3D maps of detected molecules.

12. (Currently Amended) A method comprising:

providing a femtosecond terawatt laser radiation source configured to emit pulsed laser radiation at approximately 267 nm through a portion of the atmosphere to create plasma filaments;

capturing light backscattered from the portion of the atmosphere; and

analyzing a spectral signature of the portion of the atmosphere to determine its constituents;

wherein an infrared spectrometer is utilized to measure a differential absorption in the portion of the atmosphere and a UV/VIS spectrometer is utilized for measuring absorption or fluorescence of the portion of the atmosphere.

13. (Original) The method of claim 12, wherein the analyzing step determines whether the constituents include least one of the group comprising: aerosols, airborne bacteria, viruses, toxins, dust particles, pollen, water droplets, gaseous agents, and pollutants.

14. (Original) The method of claim 12, further comprising the step of amplifying the femtosecond terawatt laser radiation source using chirped pulse amplification.

15. (Original) The method of claim 12, wherein the femtosecond terawatt laser radiation source is a Ti:Sapphire laser configured to emit energy of approximately 300 mJ per pulse.

16. (Original) The method of claim 12, further comprising the step of pulsing the femtosecond terawatt laser radiation source at a power of about approximately 3 and 4 TW with a pulse duration approximately of the order of 80 to 100 fs and a repetition rate of approximately 10 Hz.

17. (Previously Presented) The method of claim 12, wherein the femtosecond terawatt laser radiation source is configured to emit light within a second spectral range approximately centered at 800 nm.

18. (Canceled).

19. (Previously Presented) The method of claim 12, wherein the analyzing step uses at least one technique chosen from the group comprising: differential absorption, Raman, Raleigh and Mie scattering, fluorescence, flourescence LIDAR measurements, ground-based LIDAR measurements, air-based LIDAR measurements, and Raman LIDAR measurements.

20. (Original) A method according to claim 12, wherein the detection and analysis unit is configured to provide 3D maps of detected molecules.

21. (Original) A method according to claim 12, further comprising the step of comparing at least one of detected vibrational bands, detected Raman spectra, and fluorescence spectra, with previously measured spectral data to identify the constituents within the sample.

22. (Currently Amended) A system comprising:

means for providing a femtosecond terawatt laser radiation source configured to emit pulsed laser radiation at approximately 267 nm through a portion of the atmosphere to create a plasma filament;

means for capturing light backscattered from the portion of the atmosphere comprising means for measuring a differential absorption in the portion of the atmosphere and means for measuring absorption or fluorescence of the portion of the atmosphere; and

means for analyzing a spectral signature of the portion of the atmosphere to determine its constituents.

23. (Previously Presented) The system of claim 1, wherein said femtosecond laser radiation source emits laser pulses at a wavelength of approximately 267nm.

24. (Currently Amended) A method comprising:

providing a femtosecond terawatt laser radiation source configured to emit laser radiation through a sample to generate a plasma channel;

capturing light backscattered from the sample by at least two photomultipliers;

analyzing at least one spectral signature of the sample to determine its constituents using at least two spectrometers coupled to at least two photomultipliers; and

characterizing the constituents of the sample based on the analyzed spectral signature;

wherein an infrared spectrometer is utilized to measure a differential absorption in the portion of the atmosphere and a UV/VIS spectrometer is utilized for measuring absorption or fluorescence of the portion of the atmosphere.

25. (Previously Presented) A method as in claim 23, wherein the radiation source emits light at approximately 267 nm.

26. (Canceled).

27. (Previously Presented) The system of claim 1, wherein said femtosecond terawatt laser radiation source is configured to emit light within two spectral ranges, the first spectral range approximately centered at 267 nm and the second spectral range approximately centered at 800 nm.